Syllabus, PHYS 102 (Electricity and Magnetism), Spring 2022

Instructors
Dr. F. Barry Dunning, Brockman Hall 320, ext. 3544, fbd@rice.edu
Dr. Lam Yu, Brockman Hall 240, ext. 2894, lhyu@rice.edu
Dr. Robert Beaird, Brockman Hall 239, ext. 2791, rpb5@rice.edu
Dr. Michael Cone, Brockman Hall 228, ext. 2578, michael.t.cone@rice.edu
Dr. Julie Hoeink, Brockman Hall 227, ext. 4215, julie.hoeink@rice.edu
Dr. Guido Pagano, Brockman Hall 302, ext. 5780, pagano@rice.edu

Learning Objectives
This course serves as an introduction to electricity and magnetism. You will learn about the nature of charge in matter and about the physical interactions between charges as described by Maxwell's Equations. Applications to basic circuit elements in both DC and AC circuits will also be addressed.

Announcements
Announcements are made on the Physics 102 Canvas page under the "Announcements" tab. Registering for PHYS 102 automatically registers you for the PHYS102 site on Canvas.

General Format of the Class
This class will primarily be taught in-person, except for when Rice University policy dictates that the course be delivered in a remote fashion (*e.g.*, the first two weeks of class). Office hours may be either in-person, online, or hybrid at the discretion of the individual instructors.

In person:
Plenary course meetings (PHYS 102) will be held Monday and Wednesday at 9:00 am and 10:00 am in Herzstein Amphitheater. In these sections concepts will be explained and illustrated through lectures and demonstrations. While you must be enrolled in either PHYS 102 Section 001 at 9:00 am or PHYS 102 Section 002 at 10:00 am, you may attend either lecture. A recording of one of the plenary sessions will be made for students to review after the fact. The recording will be posted to a Canvas Module.

Small group discussions (PHYS 104) will be held either Thursday, or Friday according to your assigned section. In these small group discussions, you will work with classmates to solve problems posed during class. To get credit for PHYS 102, you must register for PHYS 104 and choose a section that fits your schedule. A recording of one of the discussion sessions will be available for students to review after the fact.

Remote:
Plenary course meetings (PHYS 102) will be held Monday and Wednesday at 9:00 am and 10:00 am by Zoom, using the relevant Zoom room (found on the PHYS 102 Canvas main page). The 9 AM online plenary meeting will consist of a standard lecture. The 10 AM online plenary meeting will take a flipped-classroom approach: it will consist of problem solving

and discussion, based upon material covered in pre-recorded expository videos that will be posted to Modules in Canvas beforehand. For the 10 AM session, it is assumed that students will have watched the pre-recorded videos before attending the problem session. Recordings of the online plenary sessions will be made for students to review after the fact. The recordings will be posted to a Canvas Module

Small group discussions (PHYS 104) will be identical to what is described for in-person instruction, except that the discussion sections will meet using the Zoom room that their instructor has posted for online office hours. The Zoom room information can be found on the PHYS 102 Canvas page and/or the individual PHYS 104 Canvas pages. A recording of the discussion material will be available for students to review after the fact.

To reiterate, you must be signed up for both PHYS 102 and PHYS 104. You must regularly attend your assigned section of PHYS 102 to get credit for PHYS 104.

Laboratory

There will be two components to each lab, and to complete both components, students will use the Pivot Interactives platform from Vernier. The first part of each lab consists of one and more online lab exercises. These online lab exercises are labeled as "(Completely ONLINE; Could be completed before arriving at the lab room) on Pivot Interactives." It is recommended that students attempt to complete the online lab exercises before coming to lab. These online lab exercises are designed to introduce analysis techniques, such as linearization of data and uncertainty identification and propagation, that students will need to complete the in-class component of the lab. The second component of each lab is the in-class lab exercises. They are labeled as "(Must be completed in the Lab room)" on Pivot Interactives. **You must bring your own laptop or tablet to the lab room to complete the in-class lab exercises on Pivot Interactives. The computers in the lab room are not connected to the internet!!!** Students must purchase access to Pivot Interactives which costs $10. To purchase access to Pivot Interactives and access to laboratory exercises, you will need the Class Key, which will be emailed to you on January 17th after the lab registration is completed. For more information regarding the lab, please go to https://lhyu.github.io/Manual/102general22.pdf to read the laboratory syllabus.

All questions related to the laboratories should be directed to Dr. Yu.

Textbook/WebAssign

We are using the textbook **Physics for Scientists and Engineers**, 10th Edition, by Serway and Jewett (ISBN-13: 978-1337553278). Along with the textbook, you will need a WebAssign subscription in order to access and complete the homework for the course.

Note: Students who took Phys 101 in Fall 2021 and purchased the Cengage Unlimited single term ("4 months") access should be able to register for the Phys 102 WebAssign page without any additional purchase. Please let us know if there are any issues with this.

To simplify the process of getting the textbook and WebAssign access (should you be new to the 101/102 course sequence) we recommend purchasing a 1-term (4 months) Cengage

Unlimited subscription at https://www.cengage.com/unlimited/ . This will get you full access to the WebAssign homework materials for the course, as well as access to an electronic version of the textbook. However, each student should select the option that best suits their needs. We will discuss the various purchase options on the first day of class, so feel free to wait until then to make your purchase. Students should also note that a single active Cengage Unlimited account should cover other Cengage-based materials (WebAssign, MindTap, *etc*.) required for additional courses taken concurrently with Physics 102. For a small additional cost, you can also rent a physical copy of the textbook for one semester.

If you are creating a new WebAssign account for this course (*e.g.*, you did not take PHYS 101 last semester), please make sure you ***register with your name as it appears on Canvas and/or your Rice ID***. Also, please enter your Student ID number. This registration process will give you free access for the first 14 calendar days of the semester (measured from the start date of course).

If you opt to obtain a hard copy of the text, you may wish to purchase/borrow an older edition of the book, *e.g.*, the hardbound 9th edition (ISBN-13: 978-1133947271) or the loose-leaf 9th edition (ISBN-13: 978-1305080362). (We used the loose-leaf hybrid edition for the past few years... so you likely know someone who has a copy for borrowing/purchase.) Note that the chapter layout of the 9th edition differs somewhat from the 10th edition.

WebAssign Registration
When registering with WebAssign, a 'class key' is required to access the PHYS 102 material for the first time. The class key will be provided on or before the first day of class, and will be posted on the Canvas course page. Please fill in your Student ID when registering with WebAssign. This will help ensure you get proper credit for your work.

OpenStax
You are encouraged to use the free *University Physics* textbook available through OpenStax as a supplemental text for the course. The book is available in both e-text and PDF formats. You should check on updates from time to time.
e-text: https://openstax.org/details/books/university-physics-volume-2
You can also download the pdf using the same link.

Calculators and Symbolic Programs
You should have a hand-held calculator for use in doing calculations in homework sets, pledged problem sets, quizzes, and exams. It does not need to be programmable, but it should compute trigonometric and exponential functions. You may not use symbolic manipulation programs, calculators or websites to complete your homework, quizzes, pledge problems, or exams.

WebAssign Homework
You will be assigned weekly homework problems in the WebAssign online homework system. These will provide experience in problem solving and in using the concepts discussed in the course. They are selected to help you prepare for the pledged problems, and exams. You are encouraged to discuss these suggested problems with fellow students,

tutorial leaders, and instructors. You may attempt to answer each question up to 5 times in WebAssign for full credit. Note that students will get individualized versions of the problems (*i.e.*, the numbers in your version of the problem may be different to your classmates) so you will need to work out the final answers for yourself.

Pledged Problems
Pledged homework problems will be distributed weekly online via WebAssign. These are intended to give you some experience in working, completely on your own, problems that are typical of those that will appear on exams. **You may consult your own notes, problem solutions we have posted, your own textbook (including the eBook version), and a calculator; all other resources are banned. You may not work with other students.** The pledge problems will consist of multiple choice and numerical or symbolic response questions. They are to be taken in a single sitting and with a 2.5 hour time limit.

Once you have started the assignment, the timer does not stop, even if you close WebAssign. The actual due date for a pledged problem is either the date and time when the timer expires or the original assignment due date and time, whichever comes first. For example, if you start a 10-minute pledged problem set 3 minutes before the due date and time, you will only have 3 minutes to complete it.

Pledge problem scoring: The first attempt for each individual part of each problem is worth 100% of the allotted points, the second attempt for each individual part of each problem is worth 66% of the allotted points, and the third attempt for each individual part of each problem is worth 33% of the allotted points. After three incorrect attempts, no points will be awarded for that part of the problem. For the free-response questions the correct answer will be revealed after three incorrect attempts for a particular part of any problem.

Small Group Participation
Attendance and participation will be evaluated in the small group sessions on Thursday and Friday. Participation grades for each PHYS 104 section will be normalized across all sections of PHYS 104. This will ensure that there are not final grade differences due to the grading patterns of any particular instructor.

Tests and Final Examination
There will be two 90-minute midterm tests and a three-hour comprehensive final exam in the course. The midterm tests will be given at *7:00 PM on February 15th* and at *7:00 PM on March 29th* (both tentative). The final exam will be ***scheduled by the registrar***. Non-programmed hand calculators may be used on tests and the final examination but no books or notes will be allowed. You may not use cell phones or tablets as calculators. Grades on the free response section of tests are based on what you actually write down. Solutions to tests and the final examination will be posted to Canvas. Historically, the median class score on tests has ranged from about 55% to 70%. Typically, there is a review session a few days before the exam.

Grades on the free response section of exams are based on what you actually write down. Ordinarily, the answer to a problem by itself, even if correct, is not sufficient to obtain full

credit; you must also show that your method of solution is correct. Proper physical reasoning, when clearly demonstrated, will earn significant amounts of partial credit, even in the face of grievous mathematical errors. *The grader should be able to determine, without guessing, the steps used to solve the problem.*

Regrading Policy
Do not write in a graded exam book or homework problem after it has been returned to you. If, after consulting the solutions we have prepared, you feel that your work was not correctly graded, please direct our attention to the specific issues by means of a note on a separate sheet stapled to your paper. *Submit it to your instructor within one week of the date the solutions are posted on Canvas*. We will review the grading of the portion in question, and re-determine the grade that the paper deserves. We may also review the rest of the paper to ensure that your grade is consistent with the instructions given to the graders.

Make-ups and Excused Days
Make-ups for missed pledged problems, tests, or laboratories will be given at the discretion of the instructor. You can be excused without penalty or be allowed a delayed make-up of pledged problems or tests if one of the following two conditions is met:

1. You are on official university business or you have a conflicting class, and you notify us well beforehand. If you have a conflicting class, a signed note from the instructor of that course is required stating that you actually attended class on the day of the test.

2. You have a serious reason beyond your control, such as your own illness or a death in your family, and you get word to us immediately. As soon as possible, notify your instructor in writing or by e-mail. (The policy on laboratory make-ups is stated in the lab manual available on Canvas).

Grades
Your final PHYS 102 grade will be determined from an average that will be weighted as follows:
Two Tests ---------- 15% each
Final Exam ---------- 20%
Pledged Problems ---------- 15% (one lowest score will be dropped)
WebAssign Homework------- 10%
Laboratory ---------- 15%
PHYS 104 Participation------ 10%

Additionally, you must receive a final laboratory grade of 50% or above in order to pass PHYS 102.

You should retain all your tests, pledged problems, suggested problems, and the final exam so that you can confirm the accuracy of our records, which we will update regularly on Canvas. Students who receive a weighted average of 90% or greater will receive a grade of

at least A-, while those obtaining a weighted average of 75% or greater will receive a grade of at least a B-, and those students who obtain averages of 60% or greater will receive a grade of at least C-. We may lower these cut-offs at the end of the semester, but we will not raise them. In PHYS 104 you will receive a grade of Satisfactory or Unsatisfactory.

The Honor System

We believe very strongly in the Rice Honor System: it applies to all work submitted for a grade in the course (except for suggested problems), and we perform our due diligence as instructors in upholding it. The Honor Pledge should be written in full and signed on the pledged problems, tests, the final examination, and any other work that has been announced as pledged. Note:

1. Students will be seated in tests and exams in alternate rows, alternate seats, or as otherwise directed by the person administering the test or examination.

2. Test or examination papers will not be taken from the examination room without the permission of the person administering the test or examination. If you have a special problem with taking a test in the place to which you have been assigned, please let us know.

Numerous resources for solving physics problems are available via the Internet. These sites can be perfectly legitimate tools when seeking additional examples to learn difficult concepts, but none of them are permitted for use on pledged assignments, such as quizzes, pledged problems, and tests. We are aware of many of these sites and maintain user profiles on them that allow us to check for PHYS 102 course content appearing thereon.

Students with Disabilities

Any student with a documented disability who is seeking academic adjustments or accommodations is requested to speak with the instructors during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities are encouraged to also contact Disability Support Services in the Allen Center (e-mail: adarice@rice.edu, phone: 713-348-5841) during the first two weeks of class so that timely and appropriate arrangements may be made.

Title IX

Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination or gender discrimination or relationship, sexual, or other forms interpersonal violence to seek support through The SAFE Office. Students should be aware when seeking support on campus that most employees, including the PHYS 102 instructional team, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please the SAFE Office page (safe.rice.edu) or email titleixsupport@rice.edu.